

The listing of claims will replace all prior versions, and listings, of claims in the application:

### **LISTING OF CLAIMS**

**Claims 1** (currently amended): A method to improve a combinatorial high throughput screening ("CHTS") experiment program, said method comprising steps of:

formulating an array of experiments, each of which is conducted with a predetermined set of conditions, said array comprising elements of a library of said CHTS experiment program ~~a mixture of at least two components;~~

conducting ~~an~~ said experiments on the of said array to produce results; ~~and~~

applying at least one Six Sigma technique to a common step of the said experiments to identify at least one part of said step wherein at least a defect occurs; and

~~improve~~ implementing an improvement on said step of said experiments to improve results of the said experiments;

wherein said step of applying at least one Six Sigma technique comprises performing a plurality of iterations of each of said experiments, each of which is conducted with a predetermined set of conditions, wherein each of said conditions is randomly selected from a population having a predetermined means and a predetermined standard deviation, and wherein said iterations of each of said experiments is performed until at least 3 defects have occurred or until one million defect opportunities have been counted.

**Claim 2** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and said method additionally ~~comprising~~ comprises monitoring the step of formulating the array of a said mixture.

**Claim 3** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and said method additionally ~~comprising~~ comprises monitoring the step of formulating the array of a said mixture and identifying the step as an opportunity for a defect.

**Claim 4** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and said the array of a said mixture is formulated by delivering components of reactants to a well of an array plate

**Claim 5** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and said the array of a said mixture is formulated by delivering components of reactants to a well of an array plate using a robotic dispenser.

**Claim 6** (original): The method of claim 1, wherein applying at least one Six Sigma technique includes identifying a defect opportunity.

**Claim 7** (currently amended): The method of claim 1, wherein applying at least one Six Sigma technique includes identifying a defect opportunity selected from steps of monitoring a stock precursor solution, mixing an aliquot of the stock solution with an aliquot of another solution, delivering a mixture of the aliquots to a well of an array plate, effecting a condition of reaction on the mixture, detecting a result of the reaction and analyzing the result to determine either a lead or ~~to determine~~ a candidate ~~library~~ set of experiments for reiterating the experiments.

**Claim 8** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and said steps of formulating and conducting comprise comprising (A) an iteration of steps of (i) formulating an array of mixtures of at least two components; (ii) reacting the array mixtures; and (iii) evaluating a set of products of the reacting step and (B) repeating the iteration of steps (i), (ii) and (iii) wherein components of a successive array of mixtures selected for a step (i) are chosen as a result of an evaluating step (iii) of a preceding iteration.

**Claim 9** (original): The method of claim 1, wherein applying the Six Sigma technique comprises determining a Sigma value as equal to an absolute value function of a difference between average value of measurements on the system minus a nearest specification divided by a standard deviation of the measurements on the system.

**Claim 10** (original): The method of claim 1, wherein applying the Six Sigma technique comprises determining a Sigma value as equal to per million occurrences of a ratio of

number of defects of a product to number of opportunities for defect times number of units of the product.

**Claim 11** (original): The method of claim 1, wherein applying at least one Six Sigma technique includes identifying a step of delivering stock solution to a well or substrate as a critical to quality defect opportunity.

**Claim 12** (original): The method of claim 1, wherein applying at least one Six Sigma technique includes identifying a defect as a ternary mixture concentration that deviates more than  $(l/3*\sqrt{3})$  from a design concentration where  $l$  is a height of an equilateral triangle of a graphic representation of the mixture.

**Claim 13** (original): The method of claim 1, wherein applying at least one Six Sigma technique includes calculating a Sigma value equal to  $(l/3*\sqrt{3})/\sigma_P$  where  $l$  is a height of an equilateral triangle of a graphic representation of the mixture and  $\sigma_P$  is standard deviation.

**Claim 14** (original): The method of claim 1, wherein the Six Sigma technique includes establishing a project goal Sigma value of at least 4.5.

**Claim 15** (original): The method of claim 1, wherein the Six Sigma technique includes establishing a project goal Sigma value of at least 5.0.

**Claim 16** (original): The method of claim 1, wherein the Six Sigma technique includes establishing a project goal Sigma value of at least 5.5.

**Claim 17** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique includes (1) selecting a point on a gradient representation of the mixture; (2) selecting a design concentration for each stock solution and an estimate of the standard deviation for each stock solution used to generate a mixture represented by the point; (3) determining an amount of each stock solution required to generate the mixture; (4) randomly selecting another stock concentration value from normal value distributions of concentration from the point mixture; (5) calculating a delivered concentration of components of a mixture resulting from mixing design amounts of stock solution; (6) calculating a distance between delivered

concentration and the design concentration; and (7) counting a defect when the calculated distance exceeds  $1/3 \cdot \sqrt{3}$ .

**Claim 18** (original): The method of claim 17, wherein steps (3) to (7) are repeated until at least 3 defects are counted.

**Claim 19** (original): The method of claim 17, wherein steps (3) to (7) are repeated until at least 10 defects are counted.

**Claim 20** (original): The method of claim 17, wherein steps (3) to (7) are repeated until 1,000,000 defect opportunities are counted.

**Claim 21** (original): The method of claim 17, wherein the mixture is a ternary, quaternary or pentanary mixture.

**Claim 22** (original): The method of claim 17, wherein steps (3) and (4) are determined according to formulas (III) through (VII) based on an assumption of no error in the stock solution concentration.

**Claim 23** (currently amended): The method of claim 17, wherein the distance between delivered concentration and design concentration is calculated according to the formula (where SQRT is the square root function):

$$\text{Distance} = \text{SQRT}((G1'-G1)^2 + (G2'-G2)^2 + (G3'-G3)^2) \quad (\text{Equation VIII}).$$

**Claim 24** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique identifies at least one of viscosity of stock solution, speed of withdrawal of solution from a stock solution vial, speed of addition to an array well and diameter of pipet tip as an area for improving Sigma of the formulating step.

**Claim 25** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique includes calculating a ratio of defects/opportunities.

**Claim 26** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique includes calculating a ratio of defects/opportunities and the calculated ratio is normalized to a Sigma value.

**Claim 27** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and wherein the Six Sigma technique includes calculating a ratio of defects/opportunities and the calculated ratio is normalized to a Sigma value by comparing the ratio to a Sigma chart.

**Claim 28** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique includes calculating a ratio of defects/opportunities and the calculated ratio is normalized to a Sigma value by comparing the ratio to a Sigma chart stored in the data base of a processor.

**Claim 29** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the Six Sigma technique includes calculating a ratio of defects/opportunities and the calculated ratio is normalized to a Sigma value corresponding to defects per million opportunities (DPMO).

**Claim 30** (original): The method of claim 1, wherein a low Sigma cause is identified and Sigma is improved by improving the low sigma cause.

**Claim 31** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include a catalyst system comprising combinations of Group IVB, Group VIB and Lanthanide Group metal complexes.

**Claim 32** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include a catalyst system comprising a Group VIII B metal.

**Claim 33** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include a catalyst system comprising palladium.

**Claim 34** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include a catalyst system comprising a halide composition.

**Claim 35** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include an inorganic co-catalyst.

**Claim 36** (currently amended): The method of claim 1, wherein each of said experiments is conducted on a mixture of at least two components, and the components include a catalyst system that includes a combination of inorganic co-catalysts.

**Claim 37** (currently amended): A method, comprising:

identifying a reactant delivering step as an opportunity for a defect in a combinatorial high throughput screening ("CHTS") experiment program, each of experiments of said program comprising said reactant delivering step;

measuring a number of units produced by the delivering step;

measuring defects in the units produced by the reactant delivering step of the repeated CHTS experiments; and

calculating a defects per unit for the reactant delivering step.

**Claim 38** (currently amended): The method of claim 37, wherein the CHTS experiment program comprises an iteration of steps of simultaneously reacting a multiplicity of tagged reactants and identifying a multiplicity of tagged products of the reaction and evaluating products after completion of a single or repeated iteration.

**Claim 39** (currently amended): The method of claim 37, wherein the CHTS experiment program comprises effecting parallel chemical reactions of an array of reactant mixtures.

**Claim 40** (currently amended): The method of claim 37, wherein the CHTS experiment program is characterized by parallel reactions at a micro scale.

**Claim 41** (currently amended): The method of claim 37, wherein the CHTS experiment program comprises (A) an iteration of steps of (i) delivering mixtures of reactants to array wells; (ii) reacting the mixtures and (iii) evaluating a set of products of the reacting step and (B) repeating the iteration of steps (i), (ii) and (iii) wherein a successive mixture of reactants selected for a step (i) is chosen as a result of an evaluating step (iii) of a preceding iteration.

**Claim 42** (currently amended): The method of claim 37, wherein the CHTS experiment program comprises effecting parallel chemical reactions of an array of ternary reactant mixtures.

**Claims 43** (currently amended): A method, comprising:

identifying a reactant delivering step or stock formulating step as an opportunity for a defect in ~~a mixture~~ experiments of a combinatorial high throughput screening experiment program;

measuring a number of units produced by the delivering step or formulating step;

measuring defects in the units produced by the delivering step or the formulating step; and

calculating a number of defects per unit for the delivering step or formulating step.

**Claim 44** (original): The method of claim 43, wherein the experiment is a ternary, quaternary or pentanary mixture experiment.

**Claim 45** (original): The method of claim 43, wherein the experiment is a ternary, mixture experiment.